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REMARKS

Claims 1-15 are pending in the present application. By this reply, claims 8-15 have been added. Claims 1, 5, 8, and 12 are independent claims.

The specification and claims have been revised to correct minor informalities and to clarify the invention according to U.S. practice. These modifications do not add any new matter to the disclosure.

Rejection under 35 U.S.C. §112, second paragraph

Claims 6 and 7 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. These claims have been reviewed and revised to fully comply with 35 U.S.C. §112, second paragraph. Thus, the rejection should be withdrawn.

Rejection under 35 U.S.C. §102(e)

Claims 1-7 have been rejected under 35 U.S.C. §102(e) as being anticipated by Gerba et al. (U.S. Patent No. 6,492,997). This rejection, insofar as it pertains to the presently pending claims, is respectfully traversed.

Gerba et al. is directed to an interactive multiwindow video display method and apparatus. As shown in FIG. 32A, Gerba et al. at step 950 first displays a program of the selected

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channel on the screen. Then the information banner is updated to reflect the selected channel and is then displayed at step 954 (see column 29, lines 40-47). In other words, when a user selects a new channel, Gerba et al. displays the program of the selected channel on the screen and then displays banner information pertaining to the selected channel. However, this causes the black screen phenomenon discussed in the "Background" section of the present specification.

In clear contrast, in Applicant's embodied invention, the channel icon of the newly selected channel is displayed on the screen before the program of the selected channel is displayed on the screen. In particular, the channel icon of the selected channel is displayed for a time duration in which the present device accesses the program of the selected channel and performs needed signal processing operations to display the program on the screen. That is, the channel icon of the selected channel is displayed on the screen during the gap in channel switching. This overcomes the problem of the black screen phenomenon and provides maximum utility of the screen during channel switching.

Therefore, Gerba et al. fails to teach or suggest, *inter alia*:

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the next channel icon is displayed during a gap in the channel switching and represents the next channel selected by the user

as recited in independent claim 1; and

displaying the channel icon of the selected channel icon on a screen during a gap in channel switching

as recited in independent claim 5.

Accordingly, independent claims 1 and 5 and their dependent claims (due to their dependency) are patentable over the applied reference, and the rejection should be withdrawn.

Conclusion

All the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. It is believed that a full and complete response has been made to the Office Action, and that the present application is in condition for allowance.

If the Examiner believes that personal communication will expedite prosecution of this application, he is invited to telephone Esther H. Chong, Reg. No. 40,953, at (703) 205-8000.

Pursuant to 37 C.F.R. §§1.17 and 1.136(a), Applicant respectfully petitions for a one-month extension of time for filing a reply in connection with the present application, and a check for the required fee of \$110 is attached.

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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,
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Attachments: Substitute specification with marked-up copy
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CHANNEL SWITCHING APPARATUS OF DIGITAL TELEVISION AND METHOD THEREOF

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a channel switching apparatus of a digital television and a method thereof, and in particular to a channel switching apparatus of a digital television and a method thereof which is are capable of making identification of a channel easier by providing OSD information related to a channel to be switched to a user when the user switches the channel of the digital television up/down.

2. Description of the Prior Art

[0002] According to a start of a digital broadcasting, a plurality of forms of a reception apparatus for a digital television such as a direct view DTV receiving the digital broadcasting, a DTV set-top box etc. are developed, and are sold.

[0003] In general, in order to select a pertinent channel among a plurality of broadcast signals received to the digital television, PAT/PMT information or PSIP information is required, in order to display the select channel on a screen, a. The received digital broadcast signal is switched into a digital channel and is displayed on the screen. A pretty good amount of time is required in order to display the digital broadcast signal on the screen.

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[0004] An ~~estimate~~ estimated required time for the display after the digital switching will now be described as below.

[0005] First, about 300 ~ 400ms time are is required for tuning and channel demodulation of a received digital broadcast signal.

[0006] In order to select a channel of the digital television, about 400 ~ 500ms time for searching a PID (Packet ID) comprised in the digital broadcast signal with each mode are is required.

[0007] There ~~is~~ are two modes for the digital television. A PAT/PMT mode requires about 400ms time in order to search the PID, and a PSIP mode requires about 500ms time in order to search the PID.

~~In-estimate time for~~**[0008]** For outputting the received digital broadcast signal as a perfect picture after transmitting it to a video decoder, maximum 728ms are required because of 500ms time for receiving an I picture and VBV delay.

[0009] After switching the digital broadcast signal into a digital channel, 100ms of coding time is more required besides the maximum 728ms ~~in a whole time~~ for displaying a perfect picture.

[0010] In the PAT/PMT mode, the ~~whole~~ total required time for displaying a picture can be described as below Equation 1.

[Equation 1]

$$400\text{ms}+500\text{ms}+500\text{ms}+730\text{ms}+100\text{ms}=2230\text{ms}$$

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[0011] In the PSIP mode, the whole total required time for displaying a picture can be described as below Equation 2.

[Equation 2]

[0012] $400\text{ms}+400\text{ms}+500\text{ms}+730\text{ms}+100\text{ms}=2130\text{ms}$

In order to display the channel selected among the broadcast signals received to by the digital television, about 2230ms time are is required in the PAT/PMT mode, and about 2130ms time are is required in the PSIP mode.

[0013] As described above, in the digital television, about 2 or 3 seconds are required in order to display the select channel on a screen. It But this may cause unpleasantness and discomfort to a user by requiring ~~lots of time~~ some to select a request channel because each channel can display a received picture after displaying a black picture for 2 or 3 seconds. The above-mentioned problem is decreased according to the development of a hardware technology, ~~however,~~ However, instant channel switching ~~does is~~ not improved, and accordingly it is still causes discomfort ~~for to~~ the user.

[0014] In addition, in order to select the pertinent channel among the digital broadcast signals in the digital television, the PAT information, PMT information and PSIP information are required.

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SUMMARY OF THE INVENTION

The [0015] An object of the present invention is to provide a channel switching apparatus of a digital television and a method thereof which is are capable of making an identification of a select channel easier by displaying a preset channel icon through an OSD before displaying the select channel on a screen in channel up/down of the digital television.

[0016] Another object of the present invention is to provide a channel switching apparatus and method for a digital television, which overcome the limitations and disadvantages of the related art.

[0017] In order to achieve the above-mentioned abject and other objects, the channel switching apparatus of the digital television in accordance with an embodiment of the present invention comprises a signal processing unit for receiving a broadcast signal, performing a digital signal processing and outputting it, a CPU for searching a pertinent icon by accessing a storing unit storing a channel ~~icon~~ icons corresponding to ~~a channel~~ the channels of the digital broadcast signal outputted of the selected channel from the signal processing unit, an icon display unit for displaying the channel icon searched from the CPU on a screen, and the storing unit for storing each designated channel icon corresponding to each received broadcast channel.

[0018] The channel switching method of the digital television in accordance with the present invention comprises an inputting process for inputting a an up/down key

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of a channel, a searching process for searching the channel selected by the up/down key of the channel, a searching process for searching a channel icon corresponding to the searched channel, and a displaying process for displaying the channel icon corresponding to the searched channel on the screen for the receiving the broadcast signal.

[0019] These and other objects of the present application will become more readily apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWING

[0020] The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention and wherein:

[0021] FIG.1 is a construction profile illustrating a channel switching apparatus of a digital television in accordance with the present invention.

[0022] FIG.2 is a flow chart illustrating a channel switching apparatus of a digital

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television in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

EMBODIMENTS

[0023] A channel switching apparatus of a digital television and a method thereof in accordance with the present invention will now be described with reference to accompanying drawings.

[0024] FIG.1 is a construction profile illustrating a channel switching apparatus of a digital television in accordance with an embodiment of the present invention. It comprises a signal processing unit 100 for receiving a broadcast signal, performing a digital signal processing and outputting it, a CPU 200 for detecting a pertinent icon by accessing a storing unit 400 storing a channel ~~icon~~ icons corresponding to a channel ~~the channels~~ of the digital broadcast signal outputted from the signal processing unit 100, an icon display unit 300 for displaying the channel icon of the selected channel outputted from the CPU 200 on a screen, and the storing unit 400 for storing each designated channel icon corresponding to each received broadcast channel.

[0025] The signal processing unit 100 comprises a digital signal processor unit 110 for processing the received broadcast signal into a digital signal and outputting it, and an analog signal processor unit 120 for processing the received broadcast signal into an analog signal.

[0026] The storing unit 400 stores program data, and sets a diagram or a

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character representing a broadcasting station in the each received broadcast signal as a channel icon corresponding to the channel, ~~it.~~ The storing unit 400 comprises a main memory unit 410 for storing in a lookup table format the channel icon ~~which is icons of the channels, each icon being~~ set by using a certain diagram or character in accordance with the received broadcast signal by the user and ~~corresponds to the channel as a lookup table format~~ corresponding to a particular channel, and an auxiliary storage unit 420 for storing data for operating a program.

[0027] The operation of the apparatus will now be described in more detail with reference to accompanying FIG.2.

[0028] First, when a power is applied, the CPU 200 ~~is inputted~~ receives program data of a the whole system from the main memory unit 410, and judges whether the channel up/down key (or channel number key) of the digital television is inputted. The data for operating the program of the main memory unit 410 is inputted from the auxiliary storage unit 420.

[0029] When the channel up/down key is inputted ~~S1,~~ (S1), the CPU 200 searches the pertinent channel ~~S2(selected channel)~~ (S2), receives a broadcast signal corresponding to the searched channel from the signal processing unit 100, and searches for an icon of the pertinent channel by comparing the ~~icon corresponding to the pertinent channel information~~ with an icon of a channel numbers and icons stored ~~on~~ in the main memory unit 410 ~~S3.~~

(S3).

[0030] The channel icon corresponding to the ~~channel is~~ pertinent channel

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obtained from the main memory unit 410 is then displayed on a screen after passing the icon display unit 300 S4(S4), and it is judged whether the other channel up/down key (or channel number key) is inputted S5.
again (S5).

[0031] When the up/down key ~~of the other~~ for selecting another channel is not inputted (S5), the CPU 200 judges whether processing of the video signal of the currently selected channel corresponding to the signal outputted from the digital signal processor unit 110 and analog signal processor unit 120 is finished, ~~when (S6).~~
When it is finished, the broadcast signal of the currently selected channel is displayed on the screen ~~S7,(S7), but~~ when the processing of the video signal is not finished, the channel icon corresponding to the ~~searched~~ currently selected channel is displayed and. If it is judged whether at S5 that the up/down key of the other for another channel is inputted, ~~when it is not inputted,~~ the above-mentioned process is performed repeatedly.

[0032] Meanwhile, when a an up/down key of a new channel is inputted before the video signal is finished, the CPU 200 searches the newly inputted channel ~~S2, is~~ inputted(S2), receives a broadcast signal corresponding to the searched channel, searches a channel icon corresponding to the new channel ~~S4(S3),~~ displays it on the screen ~~S4(S4),~~ and judges whether another up/down channel selection is inputted (S5). And, the above-mentioned process is performed repeatedly.

[0033] The channel icon stored in the CPU 200 is data about the diagram and character representing the each broadcast station in the received broadcast signal,

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and the user stores the received broadcast signal as a certain diagram and character in accordance with the broadcast station with the lookup table format.

[0034] The channel icon can be set so as to be matched directly with the broadcast station while the user searches the stored icon among the data related to the plurality of the icons stored in the CPU 200, ~~when.~~ When the broadcast station transmits the data related to the icon representing the broadcast station, the CPU 200 detects it and stores it in the main memory unit 410, ~~accordingly.~~ Accordingly the channel icon can be used in channel switching.

[0035] In addition, when a viewer does not want to display the channel icon on the screen, it is possible to set so ~~as to get~~ that the icon is not displayed by installing an additional select key.

[0036] As described above, the present invention is capable of displaying the set channel icon by the OSD before displaying the broadcast signal corresponding to the select channel in channel up/down of the digital television by the user by using the channel icon set in advance about the each channel of the digital television. The present invention is capable of making the channel identification easier by displaying ~~the channel picture stored in the OSD for the time required in order to display the user select channel broadcast in the screen, preventing black phenomenon of the screen,~~ accordingly in advance the channel icon of a newly selected channel stored in the OSD during the time required to display the program of the newly selected channel on the screen. Accordingly the present invention can ~~maximize the satisfaction of the~~ user.